

Springer Water

Abdelkader Anouzla
Salah Souabi *Editors*

A Review of Landfill Leachate

Characterization Leachate Environment
Impacts and Sustainable Treatment
Methods

 Springer

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ISSN 2364-6934

Springer Water

ISBN 978-3-031-55512-1

<https://doi.org/10.1007/978-3-031-55513-8>

ISSN 2364-8198 (electronic)

ISBN 978-3-031-55513-8 (eBook)

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This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

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Preface

The amount of waste is constantly growing due to population growth and the evolution of socioeconomic activities. Burying this waste produces leachate, a contaminated effluent created during the decomposition of organic waste and containing harmful substances like heavy metals, polyphenols, volatile organic compounds, microplastic, and microorganisms. Pathogens: These effluents emit unpleasant odors associated with ammonium ions. These discharges significantly impact the environment.

The juice created when waste is fermented, called leachate, presents a challenge when creating and managing a landfill. As landfill leachate can infiltrate through soils and contaminate streams and groundwater if not adequately collected, treated, and disposed of, it has been identified as a possible cause of soil, groundwater, and surface water contamination. In addition, groundwater and surface water can be slowly degraded due to seepage of contaminants through soil or passage into waterways. In contrast to groundwater contamination, which results from leachate infiltration and diffusion in permeable or fissured subsurface, surface water pollution by leachate may occur through overflow and liquid flow in the water system, either abruptly or gradually. Landfill leachate, a complex liquid formed within landfills, represents a significant threat to environmental resources and ecosystems due to its composition of various pollutants. Numerous scientific studies have extensively documented the potential consequences of leachate and its management strategies on soil and water quality. Nevertheless, a comprehensive evaluation of the risks associated with landfill leachate necessitates a more holistic approach that considers the immediate impacts and the indirect repercussions that may not yet have fully manifested. To illustrate, an all-encompassing leachate impact assessment should encompass not only the environmental effects but also the resulting implications on human health, emissions of greenhouse gases, and the potential effects on water security for local communities. Despite the wealth of research on landfill leachate, the current focus remains predominantly on the direct impacts of leachate, with scant attention directed toward exploring the broader environmental footprint of leachate and its corresponding management practices. In alignment with the principles of sustainable development goals, a comprehensive understanding of the ecological footprint associated with leachate management is crucial to mitigating the environmental risks

posed by leachate and advancing progress toward achieving sustainability objectives. Consequently, a thorough review of existing literature has been undertaken to evaluate the extent to which current assessment methodologies offer a holistic perspective on the crucial factors, influential variables, and environmental risks linked to landfill leachate. This review aims to shed light on the gaps in knowledge and highlight areas where further research is warranted to enhance our understanding and management of landfill leachate in a sustainable manner.

This book will be a ready reckoner of recent information regarding the impact and characterization of leachate landfills, leachate valorization, and heavy metals on a single platform. As a result, the master's and doctoral academics, researchers, and students will be able to comprehend the most recent developments in municipal solid waste landfill operations, supporting their research.

This book will inspire readers on how to deal with environmental pollution problems due to leachate contamination in freshwater and agricultural soils using various technologies.

Rabat, Morocco

Abdelkader Anouzla

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